On the Half Life of ThC'

AUTHOR(S):

Kimura, Kiichi; Hayashi, Takeo; Ishizaki, Yoshihide; Kumabe, Isao; Fukuzawa, Fumio

Abstracts of Papers

The following 40 papers are the first part out of 89 papers, read before the semi-annual meeting of the Institute on June 2 and 3, 1951.

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1. On the Half Life of ThC′

Kiichi Kimura, Takeo Hayashi, Yoshihide Ishizaki, Isao Kumabe and *Fumio Fukuzawa*

(K. Kimura Laboratory)

Using the method of delayed coincidence reported lately (vol. 23 of this bulletin), we measured the half life of ThC′. It is known ThC becomes ThC′ after the emission of β-ray and ThC′ becomes ThD after that of α-ray. So we can derive the half life of ThC′ by measuring this β-α delay.

We held the sample deposited on the thin Al foil between the proportional α counter and the G.M. β-counter of end window type arranged in common axis. The pulses from the α-counter and the β-counter were conducted into each channel of the delayed coincidence circuits.

Then we measured the distribution of the delay time between the β and α pulses.

delay time (μ sec.)	counts/hour	:	delay time (μ sec.)	counts/hour
0～0.42	3222	:	0.03～0.13	919
0～0.32	2694	:	0.13～0.23	694
0～0.23	2072	:	0.23～0.32	622
0～0.13	1378	:	0.32～0.41	528
0～0.03	459	:		

To calculate the half life of ThC′ from these data, we must perform the correction for the time lag of counter discharge.

This counter time lag is chiefly due to the trausit time of electrons caused by the initial ionization in the counter to the center wire. Taking the assumption that the transit velocity is proportional to 1/r where r is the distanae between the existing point of the electron and the centier wire (by the simple theoretical consideration), the distribution curve of the counter time lag poses itself rectangular with regard to time lag coordinate axis. We adopted as the maximum time lag of each counter equal value of 2.5×10^{-7} sec. (B. Rossi and N. Nereson, Phys. Rev. 62, 417 (1942). C. Sherwin, Phys. Rev. 71, 479 (1947). A.R. Laufer, R.S.I. 21, 244 (1950)) and could deduce from the data that the half life of ThC′ was

$$(2.7\pm0.3)\times10^{-7} \text{ sec.}$$
